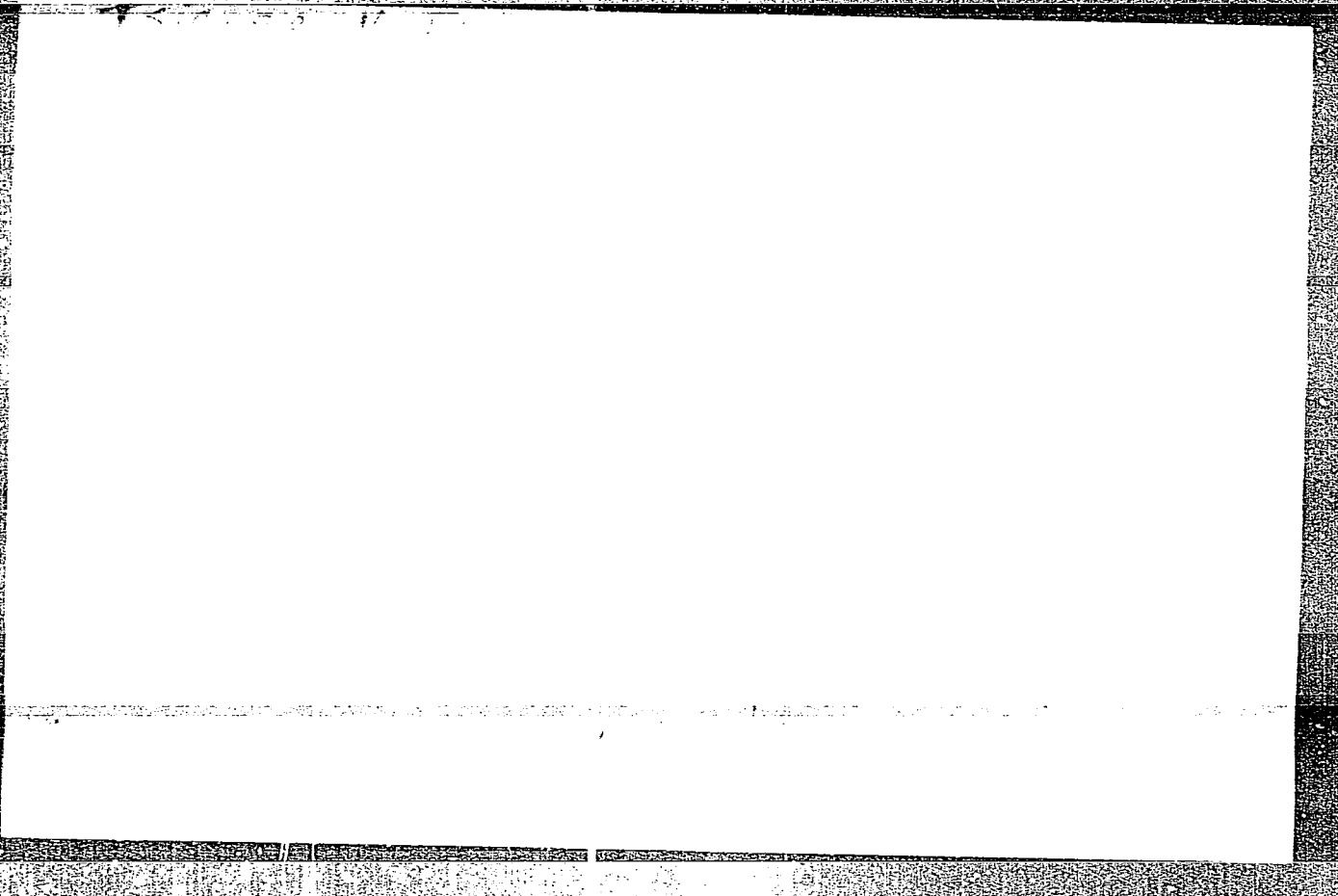


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Tsigler, V. D.

AUTHORS: Tsigler, V. D., Sidorenko, Yu. P.,
Gorfinkel', B. L., Pazukha, P. I.

131-2-3/10

TITLE: Experience Obtained in Baking Dinas Bricks in a Tunnel Furnace
Built by the Leningrad Refractory Materials Institute.
(Osvoyeniye obzhiga dinasa
v tunnel'noy pechi konstruksii Leningradskogo instituta
ogneuporov).

PERIODICAL: Ogneupory, 1958, Nr 2, pp. 57-66 (USSR)

ABSTRACT: On the strength of the established deficiencies of the
old furnaces, and of new data on the admissible baking and
cooling velocities of Dinas products the new tunnel furnace
for the baking of normal Martin- and coke - Dinas products
was planned. The new furnace was constructed in the Red-Army
Dinas plant imeni Dzerzhinskiy. Its principal outlay is
illustrated by figure 1. Its length amounts to 157'5 m, its
clear width to 2'24 m, its maximum inner height is 1'90 m.
The length of the furnace is divided into three zones: A
preheating -, a baking - and a cooling zone. Its cross-
sections with respect to the zones are shown in figure 2. The
furnace is heated with generator gas. The lengths of the old
and of the new tunnel furnace are given in table 1. The

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Experience Obtained in Baking Dinas Bricks in a Tunnel
Furnace Built by the Leningrad Refractory Materials Institute

131-2-3/10

duration of burning of the new tunnel furnace is given in table 2. The regime of the old and of the new furnace with respect to temperature and draught of the furnace are compared with each other in figure 3 and are subsequently discussed. The charge types of the raw products are illustrated in figures 5 and 6, the characteristics of their effective cross section are outlined in table 3. The tables 4, 5, and 6 contain regimes of the baking of Dinas and table 7 data on the proportion of defective products. Figure 7 illustrates the perfected methods of charging, which subsequently are discussed in detail. Table 8 shows the performance of the tunnel furnace during its test-run period. Table 9 gives the properties of Dinas and table ten its mineralogical composition. Conclusions: 1) Dinas products baked in this tunnel furnace show no difference compared with those baked in gas chamber furnaces with respect to their ceramic properties. 2) The degree of transformation required for quartz is obtained at a temperature of 1400-1440°C and a period of thermal exposure of 2 hours and 10 minutes.

Card 2/3

Experience Obtained in Baking Dinas Bricks in a Tunnel Furnace
Built by the Leningrad Refractory Materials Institute

131-2-3/10

3) A uniform heating of the Dinas products is obtained with a method of charging with an overall effective cross section of 43 %.

4) On the occasion of baking in the tunnel furnace an alleviation of operation conditions and an increase of the technical and economical parameters is obtained.

5) The defects, which turned up during the operation of the new tunnel furnace (gross preheating and rapid cooling of the raw product) must be taken into consideration in the planning of further tunnel furnaces for the baking of large Dinas products. There are 7 figures, 10 tables, and 11 references, 8 of which are Slavic.

ASSOCIATION: Institute for Refractory Materials, Khar'kov (Khar'kovskiy institut огнеупоров).
Dinas plant imeni Dzerzhinskiy (Dinasovyy zavod im. Dzerzhinskogo).

AVAILABLE: Library of Congress

Card 3/3

LIST AND INDEX										PROCEDURES AND PROPERTIES INDEX										LIST AND INDEX (INDEX)									
<p><i>bc</i></p> <p>Rapid determination of density of Dinas articles. A. N. Gerasimovskiy and V. D. Tuzovskiy (Zavod. Lab., 1934, 8, 1006—1007). — The 9 is taken from the difference in wt. of 5 g. of powdered product in air and in xylene. B. T.</p>																													
<p>ASB-5LA METALLURGICAL LITERATURE CLASSIFICATION</p>																													
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AUTHOR INDEX																										TITLE INDEX																										SUBJECT INDEX																									
<p>Talger, V. D. ACCELERATED FIRING OF SILICA BRICK FROM CRYSTALLINE URAL QUARTZITES IN PERIODIC FURNACES. <i>Ogneupory</i>, 5 (1) 7-13 (1937).—The quality of silica brick for crowns of Siemens-Martin and electric furnaces was improved by accelerating the rate of firing and cooling of the brick.</p>																																																																													

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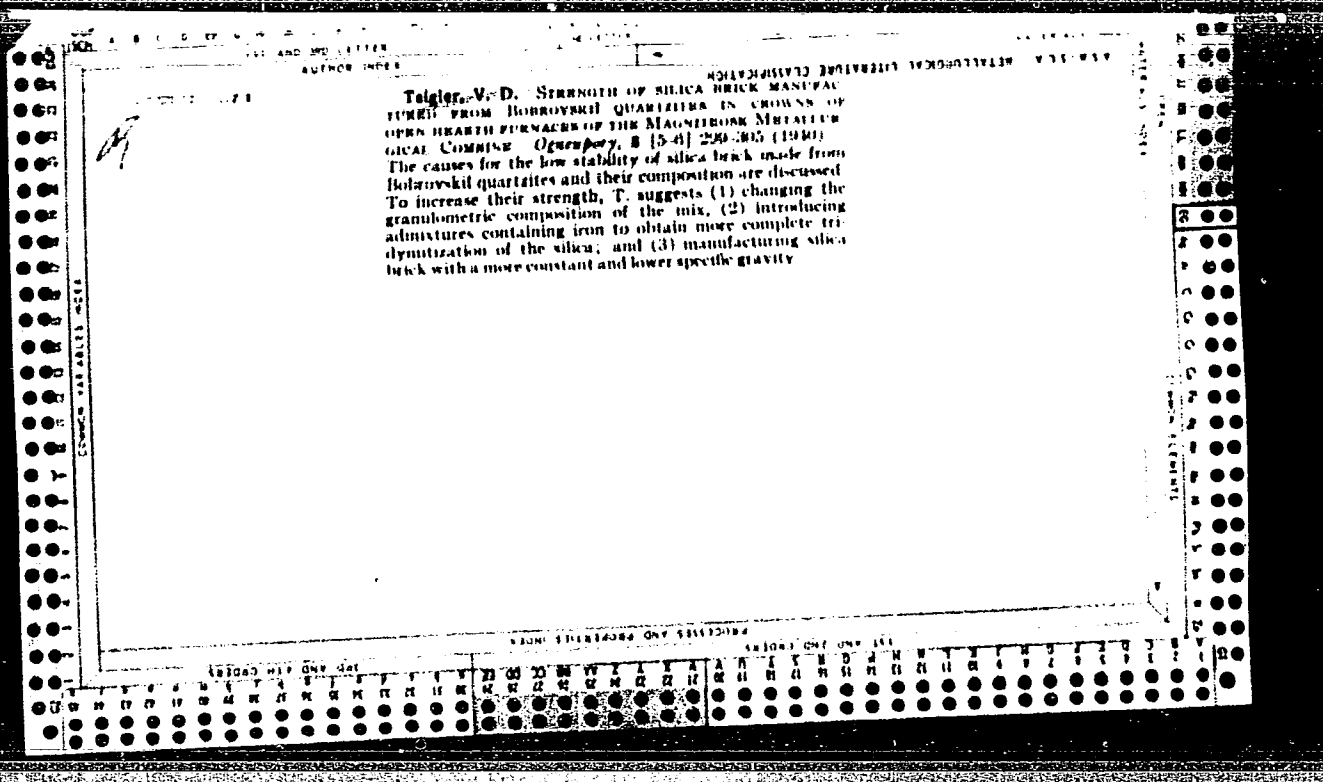
W

785. THE INFLUENCE OF CRYSTALLINE QUARTZITES AND THE FIRING SCHEDULE ON THE STABILITY OF COKE-OVEN SILICA REFRACTORIES IN FIRING.—I. S. Smelyanski, V. D. Tugler and A. N. Miroshnik (*Opneupory*, 7, 104, 1939). Manufacturing losses at a Russian silica brickworks ranged from 5 to 25%. The causes were traced to breakage and surface contamination. Production methods were developed to overcome this high wastage.

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 AND NO LETTER
 AGENCY INDEX
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Smolyanaki, I. S., and Teigler, V. D. EFFECT OF COM-
 POSITION, CHARGING, AND CONDITIONS OF FIRING IN GAS
 CHAMBER KILNS OF MANDHEIM ON SILICA BRICK. *Ogrem-
 pornyy*, 7 (6) 382-87 (1939).--Data characterizing the effect
 of charging, conditions of firing, and additions to the mix
 of crystalline quartzite on silica brick are given. Firing
 in a reducing or neutral atmosphere improves the qualita-
 tive indices of silica brick.



105.

Refractories

Increasing the life of silica brick made from Bobrovsk quartzites in the roofs of open-hearth furnaces. V. D. Tashir. *Ognespory*, 1941, No. 9, pp. 9-13 (1941); abstracted in *Trans. Brit. Ceram. Soc.*, 41 (8) 100A (1942).
Lime-bonded road brick manufactured from these quartzites failed by spalling, since penetration of Fe oxides was insufficient to bring about fusion into a monolithic structure. The addition of ferruginous mineralizers brought about an appreciable increase in life; 1% mill scale was more effective than 1.5% blast furnace dust. Lessening of the larger grains during service was eliminated by finer grinding of the batch, the maximum grain size being reduced to 5 mm.

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1

308. BANICHESKI QUARTZ-LIKE SANDSTONES AS RAW MATERIALS FOR SILICA BRICK.—V. D. Todor (Ognespory, 9, 94, 1941).

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1ST AND 2ND ORDERS																										100 AND 5TH ORDERS																									
COMMON ELEMENTS																										COMMON VARIABLES INDEX																									
<p>C</p> <p>Rapid method of determining specific gravity of quartzites and Dinas products. V. D. TAYLOR. <i>Oreography</i>, 13 [3] 131-33 (1948).—Grind the material to pass a sieve of 900 openings/cm.², place 25.00 gm. of the sample in a graduated 100- to 150- cc. tube, fill the tube one-third with distilled water, stopper, and shake thoroughly. Open the tube, add water to the mark, keep on a water thermostat for 10 to 15 min., adjust the water level again, and weigh. Empty the tube, wash, fill with water to the mark, keep on a thermostat for 5 min., adjust the water level again, and weigh. Specific gravity is determined from $d = P/(A + P) - B/D$, where d = the specific gravity, P = weight of the sample (in gm.), A = weight of the tube with water (in gm.), B = weight of tube with water and sample (in gm.), and D = specific weight of water corresponding to the temperature in the thermostat. The determination can be made in 20 to 30 min. H. Z. K.</p>																																																			
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TSIGLER, V. D.

COKE OVEN DINAS WITH MANGANESE BINDER. I. S. Smolyanskii and V. D. Tsigler.

Ogneupory, 14 [1] 9-21 (1949).--High-quality Dinas suitable for coke ovens was prepared from a mixture of 85% Ovruch quartzites and 15% Dinas scrap containing 39% < 0.088 mm., using a CaO binder. The addition of this charge of 0.5% (based on Fe₂O₃) ferruginous mineralizers improved the porosity, reheat growth, temperature of deformation under load, wear resistance, and heat conductivity. Transformation of quartz was not affected to a marked extent, but the formation of hematite crystals reduced the resistance to carbon-containing gases; hence, the addition of large amounts of ferruginous substances to increase tridymitization is not recommended. Dinas prepared from the above charge but using an Mn binder (1 MnO + 1% CaO) compared favorably with Dinas made with iron binder. Characteristics were as follows: specific gravity 2.373 and 2.372, compressive strength 356 and 337 kg./cm.², porosity 20.0 and 20.2%, refractoriness 1710 and 1710° C., temperature of deformation under load of 2 kg./cm.² 1656 and 1654° c., reheat growth 0.28 and 0.75%, heat conductivity 1.70 and 1.50 cal./hr.m.² C., wear resistance 0.28 and 0.47 gm./cm.², tridymite content 69.3 and 62.5%, cristobalite content 19.0 and 23.5%, and quartz content 11.6 and 14.0% for Dinas with Mn and iron binder, respectively. A still greater degree of tridymitization was obtained from the same charge having 42% < 0.088 mm. and a maximum grain size not over 3 mm. The properties of Dinas with Mn binder were not impaired by using a charge consisting of 60% Ovruch quartzites, 25% Prechistov quartzites, and 15% Dinas scrap. Most effective ratios of MnO:CaO vary from 1:1 to 1:2; the first ratio is preferred, and absolute amounts should be 1% MnO and 1% CaO. Nikopol Mn ores can be used as the binder. For best results, charges containing 50% or more of Ovruch quartzites should have the following granulometric composition: maximum grain size 3 mm., 15 to 20% 0.5 to 0.088 mm., and about 40% < 0.088 mm.

B.Z.K.

TSIGLER V. D.

May 49

USSR/Engineering
Refractories
Open-Hearth Furnaces

"Working Properties of Dinas Brick Used in Open-Hearth Furnaces," Prof. I. S. Kaynarskiy,
Dr. Tech Sci, V. D. Tsigler, Engr., 17 pp *125-137*

¹⁴
"Ogneupory" No **3**, 1949

Constructed experimental unit to determine tensile (elongation) strength of hot Dinas bricks under conditions approximating those found in open-hearth furnaces during over-heating. Tested Dinas samples from 11 plants, six southern and five eastern, and one Dinas sample of "Standart" type. Tensile strength was evaluated by value of relative elongation, temperature, and nature of break or elongation.

PA 44/49Th6

Service characteristics of arch Dinas—experimental investigation of the formation of threads during over-heating of Dinas. I. S. KAINARSKI AND V. D. TAGILAN. *Gineupory*, 14 [5] 212-28 (1949).—The authors developed a laboratory method for determining the capacity of Dinas to form threads due to overheating which is applicable to conditions prevailing in the arch of an open-hearth furnace. T-shaped samples of Dinas are heated in a kryptol furnace up to 1720° C. in 5 hr.; the average temperature rise during the 20° to 1000°, 1000° to 1300°, 1300° to 1600°, and 1600° to 1720° intervals is 10°, 5°, 3.5°, and 2°/min., respectively. The capacity of the Dinas to form threads is evaluated on the basis of relative elongation, temperature, and nature of thread formation or rupture. Extensive tests were conducted with Dinas produced by southern and eastern plants of the Soviet Union and also with laboratory-made samples to determine the effects of the type of quartzite, grain composition, binder, and method of preparation upon the capacity and character of thread formation. Dinas from southern plants formed threads during overheating; relative elongation ranged from 1.7 to 3.2. Dinas from some eastern plants formed threads fairly well (relative elongation 2.0 to 2.2), while Dinas from other plants formed only small kicles (relative elongation 1.3 to 1.6) followed by rupture. When Dinas formed long threads, the surface was completely fused over and rupture occurred at high temperatures, but in the case of short threads, the whole surface was not fused over and rupture occurred at lower temperatures. Dinas from cementing Lozovsk quartzite having

low SiO₂ and high Al₂O₃ and TiO₂ contents was capable of forming kicles to a greater extent than Dinas from crystalline Pervoural'sk quartzite having high SiO₂ content. Fine-grained Dinas showed a greater tendency to form threads, and coarse-grained Dinas had a greater tendency to rupture; these characteristics are inherent in both types of quartzites, but the difference between fine- and coarse-grained Dinas was more pronounced in the case of the crystalline quartzite. The effect of the initial specific gravity was less pronounced than the nature of the quartzite and the grain composition. Dinas from Lozovsk quartzite (Al₂O₃ + TiO₂ = 3.56%) formed threads more intensively than Dinas from Prechistovsk quartzite (Al₂O₃ + TiO₂ = 1.90%). Binders tested were CaO, CaO + FeO, FeO + Al₂O₃, and FeO + Al₂O₃ + MgO. Coarse-grained Dinas of Pervoural'sk quartzite having low and high specific gravity was incapable of forming threads regardless of the binder used; fine-grained Dinas, on the other hand, formed threads regardless of the binder and specific gravity. Lime binder prevented rupture to a greater extent than the other binders; this was particularly noticeable for Dinas of low specific gravity which did not rupture at 1700° while the others ruptured at 1670° to 1690°. Coarse-grained Dinas of Lozovsk quartzite having low and high specific gravity acquired the ability to form threads when made with the binders 2 to 3% CaO, 2% FeO + 0.7% Al₂O₃, and 2% FeO + 0.7% Al₂O₃ + 0.5% MgO; fine-grained Dinas formed threads with all binders. The formation of threads can serve as an indication of overheating of the arch. This property of the Dinas, however,

ASN-SLA METALLURGICAL LITERATURE CLASSIFICATION

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should not be attained by lowering its heat resistance.
Experiments have shown that Dinas made from pure vein
quartz and fired to a specific gravity of 2.34 formed
threads at high temperatures (1700° and over). 15 photo-
graphs. Cf. *Ceram. Abstracts*, 1949, Oct., p. 2E4.
H.Z.K.

Service characteristics of arch Dinas - effect of absorption of iron oxides on the capacity of the Dinas to form threads during overheating. I. S. KATNARSKII AND V. D. TSIGLER. *Ogneupory*, 14 (7) 263-67 (1948). — Absorption of 7 to 9% iron oxides by Dinas was regulated in a tubular kryptol electric furnace in which there was a uniform temperature drop from 1600°C. at the bottom to 750° to 850° at the top of the sample 85 mm. high. Samples were then tested for their capacity to form threads during overheating (Ceram. Abstracts, 1949, Nov., p. 258c). Results show that after saturation with iron oxides the Dinas exhibits a tendency to overheat and rupture, whereas its capacity to form threads is reduced. Fine-grained Dinas had a greater capacity for forming threads than the coarse-grained form; this was true both before and after saturation with iron oxides. Dinas made from materials of less than 2 mm. and saturated with iron oxides, however, still exhibited a considerable reduction of its capacity to form threads without rupture during overheating. 4 photographs. R.Z.K.

TSIGLER, V. D.

Service characteristics of crown Dinas. I. S. KAINARSKI AND V. D. TSIGLER. *Ogneupory*, 14 [12] 532-38 (1949).—The presence of alumina (and of TiO_2) in Dinas will, with all other conditions being equal, increase the capacity of the brick to fuse together because the alumina, in lowering the temperature of deformation of the Dinas, facilitates contact between the brick. Good contact alone, however, will not insure fusion of the brick. For fusion to take place, it is necessary that (1) the spaces between the faces of the contacting brick be filled with silicate melt and (2) the melt liberate a solid phase at the service temperatures of the crown. If contact between the brick is good, the rough contacting faces will create a capillary network which will, as well as the pores of the brick, result in the capillary rise of the melts from the hot surface. Movement of primary melt formed on the working surface into the cooler regions of the crown is governed by the presence of admixtures in the Dinas; the admixtures dissolve and lower the crystallization temperature of the melt. This process continues up to a certain moment, after

when the migration stops and the process of normal wear of the Dinas starts. After this moment is reached, the conditions necessary for the crystallization of silica from the melt are present. Solid phase of silica in the Dinas is represented by quartz, tridymite, and cristobalite and at any temperatures (except points of transformation) two of these crystalline modifications are unstable. This increases their solubility in comparison with the third stable modification, so that they dissolve in the melt and supersaturate it with silica in comparison with the stable modification. As a result, the silica separates out in the solid phase. The differences in the behavior of crown Dinas are chiefly the result of unlike mineralogical composition. The presence of large amounts of stable cristobalite in crown Dinas hinders fusion of the brick. Three photographs of fused Dinas. Cf. *Ceram. Abstracts*, 1950, March, p. 47c. B.Z.K.

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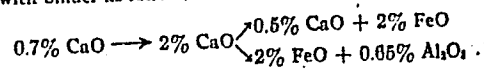
Making dense kaolin refractories at low cost

TSIGLER, V. D.

Capillary properties of Dinas and its absorption of iron oxides. V. D. TSIGLER. *Ogneupory*, 15 [5] 20. '4 (1950).—The capillary properties of Dinas were studied at room temperature with water and at 1600°C. with iron dross. In water absorption, a weighed sample was immersed for 120 sec. to a depth of 1 mm.,

withdrawn, and weighed, and the water line was noted. Capillary absorption (B) of grams of water by 1 cc. of Dinas was calculated from $B = a/f \cdot h$, where a = water absorbed (gm.), f = cross section (cm.²), and h = height of water rise (cm.). In iron absorption, a dross tablet, containing 56.3% FeO and 37.2% Fe₂O₃, was placed on a refractory support in a kryptol furnace preheated to 1000° at about 10°/min., a weighed Dinas sample heated to 600° was placed on the tablet, and the temperature was raised to 1600° at 5° to 8°/min., after which the furnace was cooled and the sample was weighed and examined. The absorption proceeded fairly uniformly. Capillary absorption (R) of grams of dross by 1 cc. of Dinas was calculated from $R = Q'/f \cdot h$, where Q' = dross absorbed (gm.), f = cross section, and h = height of

absorption line. Tests were made with Dinas from ten different works and with experimental shapes. Values of B were found to increase with the initial porosity of the Dinas, whereas R depended also upon additional porosity caused by loosening of the Dinas during the test. For water, capillary absorption (C) by 1 cc. of Dinas pores is determined from $C = B \cdot 100/b$, where b = porosity (%); for dross, capillary absorption (G) by 1 cc. of Dinas pores is determined similarly. The average value of C was 0.680 gm./cc. for all cases; C decreased with fineness of grains and with binder as follows:



G increased with specific gravity and varied within the narrow range of 1.30 to 1.41. The ratio of R/B was approximately 2. Capillary absorptions of water and dross are similar; both methods can be used for comparative evaluation. B.Z.K.

TSIGLER, V. D.

1. KAYNARSKIY, I. S., TSIGLER, V. D., STOVBUK, A. V.
2. USSR (600)
4. Refractory Material
7. Continuous mixing of Dinas bodies. Ogneupory 17 no. 4, 1952, Prof. Dokt., Khar'kovskiy Institut Ogneuporov.
9. Monthly List of Russian Accessions. Library of Congress, August 1952.
UNCLASSIFIED.

TSIGLER, V. D.

USSR/Engineering - Refractories, Dinas

Jun 52

"Modification in Properties of Dinas Furnace Roof
on Heating to 1,690° Without Action of Iron Oxides,"
V.D. Tsigler, Engr, Khar'kov Inst of Refractories

¹⁷
"Ogneupory" No 6, pp 252-262, 1952

Studies behavior of dinas in overheated furnace roof
using dinas bricks from 9 plants. Under effect of
high temp, zonal structure along thickness of roof
is formed and loosening of dinas clinker to 40-mm
depth occurs. Loosening is conditioned by proper-
ties of raw material, grain compn of initial ma-
terial, and deg of quarts transformation into dinas.

220T42

TSIGLER, V. D.

"C hanges in the Dinas Brick in the Crown of an Open-Hearth Furnace and the Influence of the Absorption of Ferric Oxide on Its Operating Properties." Cand Tech Sci, Khar'kov Polytechnic Inst imeni Lenin, Min Culture USSR, Khar'kov, 1954. (KL, No 2, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

2896 Tsigler, V. D.

Izmeneniye dinasa v svode martenovskoy pechi i vliyaniye poglosheniya okislov zheleza na yego rabochiye svoystva. Khar'kov, 1954. 12 s. 20 sm. (M-vo kul'tury SSSR, Khar'k. politekhn. in-t im. V. Il Lenina). 110 ekz. Bespl. - (54-56204)

TSIGLER, V.D.; BOVKUN, S.S.; SIDORENKO, Yu.P.; KALYUZHNYI, P.T.; PAZUKHA, P.I.

Efficient firing of coke dinas in gas-heated compartment kilns.
Ogneupory 19 no.5:195-201 '54. (MIRA 11:7)
(Firebrick) (Kilns)

SOV/137-58-11-21913

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 11, p 11 (USSR)

AUTHORS: Kaynarskiy, I. S., Tsigler, V. D.

TITLE: Using Lightweight Silica Brick in Industrial Furnaces (Primeneniye legkovesnogo dinasa v promyshlennyykh pechakh)

PERIODICAL: Byul. nauchno-tekhn. inform. Vses. n. -i. in-t ogneuporov, 1956, Nr 1, pp 94-111

ABSTRACT: A description is offered of a long-term experiment in the utilization of lightweight silica brick in the lining of reheat furnaces (F) in the rolling and forge departments of metallurgical and machinery-manufacturing plants, and in periodic, box-type gas, ring, and tunnel F at refractories plants. Recommendations are advanced for particular design components of F which the accumulated experience indicates should be laid of lightweight silica brick.

Ya. G.

Card 1/1

TSIGLER, V.D.; KAMINSKIY, V.K.; KUSHNERIK, N.I.; PANKRATOV, D.I.;
LARENKOV, A.P.; EYSMOND, M.V.

Redesigning certain elements of low tonnage gas chamber kilns for
burning dinas bricks. Ogneupory 21 no.3:107-114 '56. (MLRA 9:8)

1. Khar'kovskiy institut ogneuporov (for TSigler). 2. Krasnogo-
rovskiy ogneuporny zavod (for Kaminskiy, Kushnerik, Pankratov,
Larenkov, Eysmond).

(Firebricks) (Kilns)

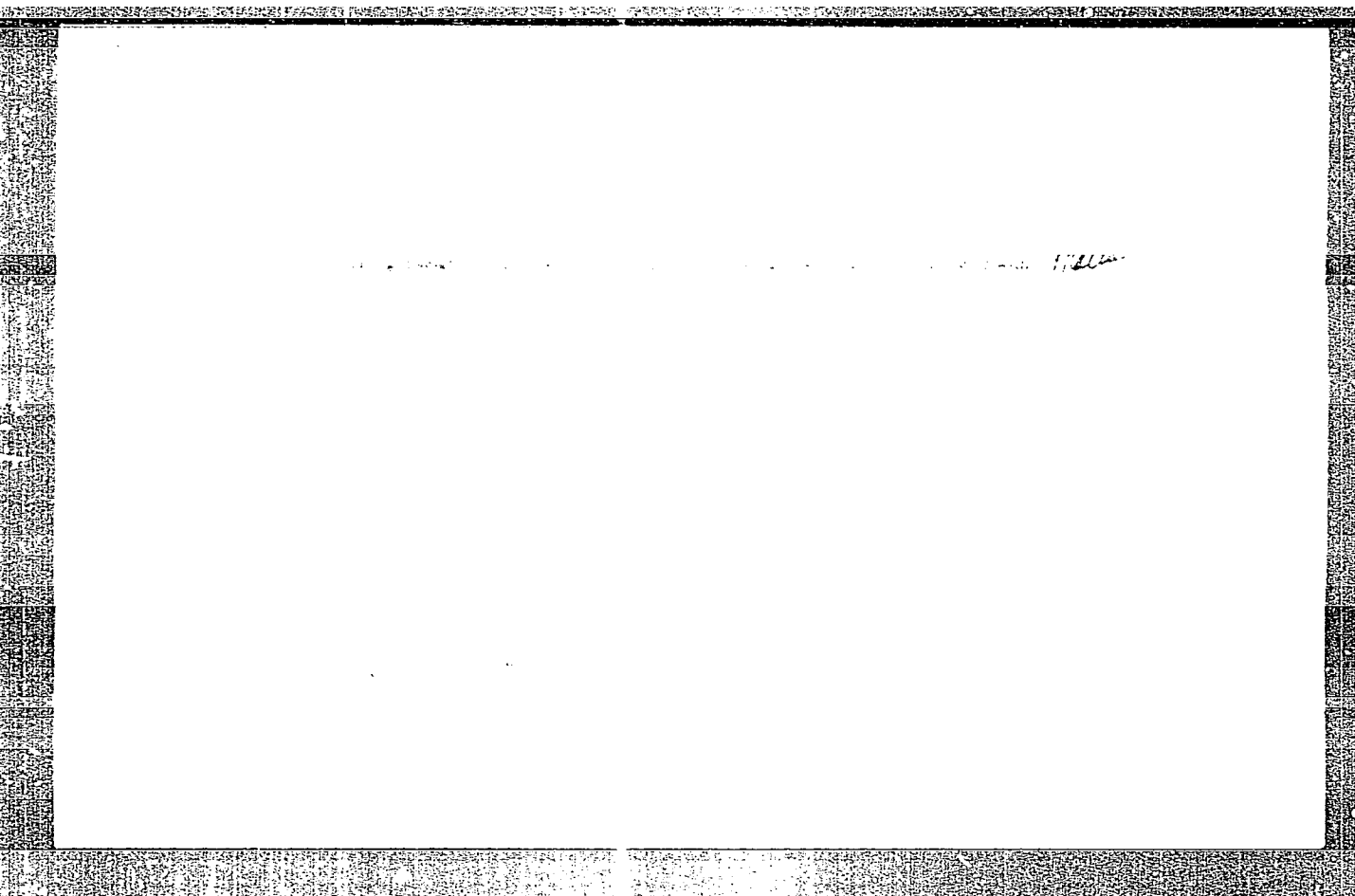
TSIGLER, V.D.; PINDRIK, B.Ye.; BOVKUN, S.S.; SIDORENKO, Yu.P.

Ways to reduce rejects in standard dinas bricks burned by the
gas-chamber kiln process. Ogneupory 21 no.5:202-206 '56.
(MLRA 9:10)

1. Khar'kovskiy institut ogneuporov (for TSigler, Pindrik)
2. Zavod imeni Dzerzhinskogo (for Bovkun, Sidorenko).
(Firebrick) (Kilns)

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AUTHORS: Tsigler, V. D. , Belukha, P. G. , Shakhnovich, I. G. ^{131-1-2/14}

TITLE: The Influence of Certain Technological Factors Upon the Properties of Light Refractory Kaolin Products (Vliyaniye nekotorykh tekhnologicheskikh faktorov na svoystva kaolinovykh legkovesnykh ogneporov)

PERIODICAL: Ogneupory, 1958, Nr 1, pp. 5 - 11 (USSR)

ABSTRACT: 1.) The influence of a burnable addition upon the refractoriness and ceramic properties of light kaolin products. Foundry coke and thermoanthracite in the piece were used as burnable admixtures. Laboratory tests and chemical analysis showed that by addition of a burnable addition the content of Al_2O_3 is decreased and that of Fe_2O_3 is increased (see table). The refractoriness correspondingly also decreases. Table 1 gives the ceramic properties of the burned test samples.

2.) The influence of the pressure altitude, the lean degree and the moisture content of the masses. The layer consisted of kaolin of the place of finding Vladimir of the type БЛ-1, fireproof clay of the same kaolin with water absorption up to 5,4 %, as well as anthracite with a 9,2 % content of ashes. The granulation of these materials is given in table 2. The volumetric weight of the mass under different conditions is given in figure 1. Figure 2 shows

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The Influence of Certain Technological Factors Upon the Properties of Light Refractory Kaolin Products

131-1-2/14

the dependence of the resistance of rupture of light kaolin products on pressure effect, lean degree and moisture content and figure 3 shows the same for the volumetric weight.

3.) The influence of the varieties of the lean admixture and its composition of grain upon the ceramic properties of light kaolin products. For this purpose a series of laboratory tests was performed with different layers. The compositions of layers and the ceramic properties of the products are given in table 4.

4.) The influence of the binding and mineralizing additions upon the refractoriness and the ceramic properties of the light kaolin products. The composition of layers and the properties of the light test samples are to be seen in table 5.

5.) The modification of the resistance to rupture and pressure of light kaolin raw material in the process of its heating is represented in figure 4. The tests are performed by A. A. Yeltysheva (reference 1).

Conclusions:

- a) The refractoriness of the light kaolin products depends on the content of ashes of the burnable admixture used.
- b) Their volumetric weight depends on the combustible addition.
- c) The resistance to pressure and rupture of these products de-

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The Influence of Certain Technological Factors Upon the Properties of Light Refractory Kaolin Products

depends on the moisture content of the masses, the lean degree of the layer by fireproof clay, their composition of grain, the introduction of a sintering admixture, the amount of pressure applied, the final temperature of burning and the duration of burning at this temperature. There are 4 figures, 6 tables, and 6 references, 4 of which are Slavic, and 1 English.

ASSOCIATION: Institute for Refractory Products, Khar'kov (Khar'kovskiy institut ogneporov)
Factory for Fireproof Clay imeni Voroshilov (Shamotnyy zavod im. Voroshilova)

AVAILABLE: Library of Congress
1. Refractory materials 2. Ceramics

Card 3/3

TSIGLER, V.D.; SIDORENKO, Yu.P.; GORFINKEL, B.L.; PAZUKHA, P.I.

Adopting the system of dinas brick burning in tunnel kilns
designed by the Leningrad Refractories Institut. Ogneupory
23 no.2:57-66 '58. (MIRA 11:2)

1.Khar'kovskiy institut ogneuporov (for TSigler). 2.Dinasovyy zavod
Dzerzhinskogo (for Sidorenko, Gorfinkel', Pazukha).
(Firebrick) (Kilns)

182664, 40, 1

57(2) **FRANK I. BONE REFRACTORIES** 809/1708
 Specialty Clay Chemistry (Metallurgy) (Refractories in Furnaces
 Metallurgy Collection of Articles) Boston, Massachusetts, 1958.
 Bristle clay. Illustrated. 4,000 copies printed.
 Ed.: H. T. Gerrish, Redwood Mt. of Publishing House: I. T. Elmwood, Wash. D.C.:
 A. L. Bunker.

REMARKS: This book is intended for engineers and technicians working in furnace
 metallurgy.

CONTENTS: The book consists of 20 articles on the development and use of re-
 fractories in the Soviet metallurgical industry. H. T. Gerrish, in the first
 paper, presents the prospects for development and research projects for the
 period 1959-1965. In subsequent articles development of refractory plants in the eastern
 part of the USSR. In general the articles deal with recent developments in
 basic and acidic refractories for blast and open hearth furnaces, and for the
 lining of ladles and special equipment used in continuous casting. The
 treatment of steel. A. A. Bunkovskiy discusses the technology of manufacturing
 magnesia and ferrochrome refractories which provide highly resistant flame brick and
 fire clay. Several authors state that good results were obtained with

Good 1/5

peroxide-splined brick and with bricks made of magnesia and chromite
 compounds. The application of new refractories, including materials, high-
 temperature mortars, lining media, and concrete, combined with advanced
 techniques in lining furnaces, are said to have more than doubled the time
 intervals between relining and overhauling furnaces. O. M. Murplov and A. O.
 Bunkovskiy discuss the use of "tagged atoms" to determine the degree of penetra-
 tion of steel by refractory-lining particles. S. A. Lezavskiy describes the pro-
 duction of refractories by the sandry pressing method employed at the Rikho-
 vskii plant, and I. A. Bunkovskiy and V. D. Trifler cover the use of lightweight
 flame bricks in industrial furnaces. The last paper written by A. L. Bunker
 covers and evaluates the physical properties and service life of fire-
 clay bricks, ferrochrome bricks, flame bricks and bricks with high alumina
 content. Graphs, diagrams, and photographs accompany the papers. For
 references, see Table of Contents.

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REMARKS: Library of Congress	

Good 1/5

80/mil
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 10

15(2)

S07/131-59-1-4/12

AUTHORS:

Tsigler, V. D., Bovkun, S. S., Sidorenko, Yu. P.,
Gorfinkel', B. L. (Deceased), Pazukha, P. I.

TITLE:

Coking Test of Coke Dinas in the Tunnel Kiln Designed by the
All-Union Institute of Refractory Products (Opyt obzhiga
koksovogo dinasa v tunnel'noy pechi konstruksii Vsesoyuznogo
instituta ogneuporov)

PERIODICAL:

Ogneupory, 1959, Nr 1, pp 19-25 (USSR)

ABSTRACT:

Table 1 indicates the period of heating, coking and cooling
of the dinas in this furnace. The change of temperature con-
ditions in the heating and cooling zones is shown in figures
1 and 2 and subsequently described in detail. Coking of the
dinas was carried out at a temperature of 1400-1440° with a
duration of 22 hours. Figures 3 and 4 show the temperature
drop according to the height of furnace. Table 2 indicates
mass products of various brands which are suitable for coking
in the tunnel kiln. Shaped coke products are made of 80%
ovruchskiy quartzite and 20-30% broken dinas. Figures 5 and 6
show the mode of settling of various brands, and figures 7,
8 and 9 show coke products of various brands. Further, the

Card 1/2

Coking Test of Coke Dinas in the Tunnel Kiln Designed by the All-Union
Institute of Refractory Products

SOV/131-59-1-4/12

coking conditions (Table 3) and the quality of dinas (Table 4) are indicated. The properties of dinas were determined in the TsZL, and its mineralogical composition in the laboratoriya dinasa Ukrainskogo nauchno-issledovatel'skogo instituta ogneuporov (Dinas Laboratory of the Ukrainian Scientific Research Institute of Refractories) (Table 5). The coke dinas coked in the tunnel kiln corresponds to the requirements of the GOST 8023-56. At these tests, it was not possible to solve the problem of coking shaped dinas products of a higher weight. The coking conditions of these products are still investigated. There are 9 figures, 5 tables and 3 Soviet references.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov
(Ukrainian Scientific Research Institute of Refractories)
Dinasovyy zavod im. Dzerzhinskogo (Dinas Works imeni Dzerzhinskiy)

Card 2/2

15(2)

AUTHORS:

Tsigler, V. D., Gorfinkel', B. L.

SOV/131-59-4-5/16

TITLE:

On Rational Laying Parameters in the Burning of Dinas Bricks
(O ratsional'nykh parametrakh sadki pri obzhige dinasa)

PERIODICAL:

Ogneupory, 1959, Nr 4, pp 162-164 (USSR)

ABSTRACT:

In the present paper the experimental data on the perfection of the laying of dinas bricks in tunnel and gas-chamber furnaces are discussed. Previously the raw dinas bricks were set pine-like in a width of 920 mm, in the last few years, however, they were laid in the southern plants pine-like in a width of 690 and 460 mm. By the tapering of the laying pines the heating and burning were accelerated. In order to compare the types of laying in individual furnaces the "determination value" was introduced which is computed from the formula $q = \frac{V}{F}$, in which q denotes the determination value in cm; V - the laying volume in cm^3 ; F - the total laying surface in cm^2 which is surrounded by gases (Table 1). From table 2 the operation characteristics of gas-chamber furnaces with pine-like laying of blanks of 920 and 460 mm may be seen. The tapering of the laying pines favors the

Card 1/2

On Rational Laying Parameters in the Burning
of Dinas Bricks

SOV/131-59-4-5/16

manufacture of products with low specific weight. From the figure the laying of raw electro-dinas bricks in gas-chamber furnaces may be seen. The characteristic features of burning conditions and the quality of the bricks are presented in table 3. Conclusions: By the tapering of the laying pines to 460 mm the operation characteristics of the furnaces in the burning of raw dinas bricks were improved. The tapered laying pines accelerate the heating and burning process of the products to a lower specific weight. The same will hold for the burning of fire-clay and other refractories in gas-chamber and periodic furnaces. There are 1 figure, 3 tables, and 3 Soviet references.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov
(Ukrainian Scientific Research Institute of Refractories),
Krasnoarmeyskiy dinasovyy zavod im. Dzerzhinskogo
(Krasnoarmeyskiy Dinas Work imeni Dzerzhinskiy)

Card 2/2

TSIGLER, V.D., PINDRIK, B. Ye.

Improvement of the performance and refractory qualities of Dinas
mortars. Koks i khim. no.3:28-31 '60. (MIRA 13:6)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneporov.
(Coke ovens) (Refractory materials)

S/131/60/000/007/008/009/XX
B021/B058

AUTHORS: Tsigler, V. D., Yeltysheva, A. A., and Pindrik, B. Ya.

TITLE: Highly Aluminous Light Products and Their Use

PERIODICAL: Ogneupory, 1960, No. 7, pp. 299-307

TEXT: The technology for these products was worked out by the foam method under laboratory conditions in the UNIIO (Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov - Ukrainian Scientific Research Institute of Refractory Materials). A test batch of highly aluminous light products was manufactured under operating conditions at the Podol'skiy zavod ogneupornykh izdeliy (Podol'sk Plant of Refractory Materials) from commercial alumina, refractory clay and wood dust. In this paper, the results of the technology elaborated are mentioned, as well as of the properties and working tests of highly aluminous light products which show a corundum-mullite composition and were obtained by the method of the fire loss of additions by pressing in semidry condition. The refractoriness, chemical composition and granulation of the components of the charge are mentioned, as well as the ceramic properties of light

Card 1/3

Highly Aluminous Light Products
and Their Use

S/131/60/000/007/008/009/XX
B021/B058

products after firing at 1550°C. Figs. 1-4 show the losses in weight, change of weight of unit volume, thermal expansion, and compressive strength of highly aluminous blanks. A batch of these light products was manufactured at the experimental plant of the UNIIO, their granulation, charge composition and characteristics of the mass being mentioned. The investigation results for the fired light products can be seen from Table 5. An industrial experimental batch of 5 t of highly aluminous light products was manufactured at the Chasov-Yarskiy kombinat ognepornyykh izdeliy (Chasov-Yar Kombinat of Refractory Materials). The characteristics of the initial raw materials are mentioned in Table 6. The products were sorted according to ГОСТ 5040-58 (GOST 5040-58). Table 7 shows the characteristics of highly aluminous light products. These were tried out as lining for the fireboxes of the stand-by boilers in tankers of the Chernomorskoye parokhodstvo (Black Sea Shipping Company). The following persons participated: I. A. Parkhonyuk, A. S. Cherkasov, A. A. Lapidus, and M. N. Kalayda. Under equal conditions, highly aluminous light products had about three times the service life of brickings from semiacid bricks. These products can be used as lining up to 1550°C. There is a prospect of using these light products in stand-by boilers of seagoing vessels with

Card 2/3

Highly Aluminous Light Products
and Their Use

S/131/60/000/007/008/009/XX
B021/B058

oil firing. For the supply of the high-sea fleet it is necessary to organize the manufacture of these light products in refractory-material plants in the south and east of the country. There are 4 figures, 7 tables, and 11 references: 6 Soviet, 1 German, 1 Canadian, and 2 British.

ASSOCIATION: Ukrainskiy nauchno-issledovatel'skiy institut ogneporov
(Ukrainian Scientific Research Institute of Refractory
Materials)

Card 3/3

TSIGLER, V.D.; NIKOLA, P.

Experimental calcination of lightweight kaolin brick in electric
kiln. 9 pages. 89 no. 28:545-548 '66. (U.S.A. 1966)

1. Upravleniye naučno-issledovatel'skiy institut ogneupora (for Tsigler).
2. Vodorazvedchivaniye shchelochnykh zaved (for Nikola).
(Kaolin) (Firebrick)

TSIGLER, V.D.; BULAKH, V.L.; KHOROLINSKIY, Yu.M.

Lightweight kaolin bricks in heating furnaces. Kuz.-shtam.
proizv. 3 no.8:38-39 Ag '61. (MIRA 14:8)
(Furnaces, Heating) (Firebrick)

TSIGLER, Vladislav Dem'yanovich; IVANOV, P.I.; red.; SKOBELING, L.V.,
red. izd-va; KHLOPOVA, L.K., tekhn. red.

[Refractory materials for lining steam boiler fireboxes on
ships] Ogneupornye materialy, primeniamye dlia kladki topok
parovykh kotlov na morskikh sudakh. Moskva, Izd-vo "Morskoi
transport," 1962. 81 p. (MIRA 15:4)
(Boilers, Marine) (Refractory materials)

TSIGLER, V.D.; PYATIKOP, P.D.

Mechanism of mass adhesion during hot gumiting of the basic
brickwork in open-hearth furnaces. Stal' 23 [i.e. 24] no.4:
313-315 Ap '64. (MIRA 17:8)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneporov.

TSIGLER, V.D.; BULAKH, V.L.; KOVAL'CHUK, Ye.I.; LEVENTSOV, V.I.

Rammed lining of blast furnace nozzles and tuyeres. Stal'
25 no.12:1078 D '65. (MIRA 18:12)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov i
zavod "Zaporozhstal'".

TSIGLER, V.D.

Improving the quality of dinas brick for glass furnaces and
increasing its durability. Ogneupory 31 no.1:36-38 '66.
(MIRA 19:1)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.

TRAGLER, V.D.; BULICH, V.L.; TARASOVA, T.Ye.

Methods of determining the slag resistance of ladle firebrick.
Ogneupory 30 no.10:31-34 '65. (MIRA 13:10)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.

TSIGLER, V.D.; PINDRIK, B.Ye.

Porous ceramics with a high alumina content and increased
gas permeability. Stek. 1 ker. 21 no.1:22-26 J. '64.

(MIRA 17:8)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.

TSIGLER, V.D.

New areas of use of the dinas brick. Ogneupory 29 no. 10:447-447
'64. (MIRA 187)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.

ACCESSION NR: AP4009527

S/0072/64/000/001/0022/0026

AUTHORS: Tsigler, V.D.; Pindrik, B. Ye.

TITLE: High alumina porous ceramics with high gas permeability

SOURCE: Steklo i keramika, no. 1, 1964, 22-26

TOPIC TAGS: ceramics, refractories, high-alumina ceramics, gas permeability, coke, chamotte, ceramics additive

ABSTRACT: The method for increasing the gas permeability of high-alumina porous ceramics and the variation in gas permeability are discussed. Experimental results showed that coke having a grain size 1.0 - 0.5 mm. is very suitable for increasing the gas permeability. Technological data are given for making high-alumina porous shaped products having a weight of up to 37 kg. and a high gas permeability by burning out additives. The relationship between gas permeability of the samples and porosity, as well as the specific surface of the pores is illustrated. Gas permeability and other properties of products are given when heated at 1500 C.

Card 1/2

ACCESSION NR: AP4009527

Orig. art. has : 4 figures, 1 table.

ASSOCIATION: Ukranskiy nauchno-issledovatel'skiy institute
ogneuporov. (Ukranian scientific research institute for refrac-
tory materials.)

SUBMITTED: 00

DATE ACQ: 03Feb64

ENCL: 00

SUB CODE: MA, PH

NO REF SOV: 007

OTHER: 004

Card 2/2

TSIGLER, V.D.; VINOKUR, S.B.; MITROKHINA, N.S.; Primali uchastiye:
CHURSINA, L.S.; KRUSHENOK, L.B.; GOLOVANEVA, V.K.; SHISTKA, R.K.

Service of forsterite lightweight bricks in the lining of
furnace cars. Ogneupory 28 no.11:504-508 '63. (MIRA 16:12)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov
(for TSigler). 2. Panteleymonovskiy ogneuporny zavod im.
K. Marksa (for Vinokur, Mitrokhina).

TSIGLER, V.D.; CHURSINA, L.S.

Rapid method of determining the content of burning-out additives in the production of certain lightweight refractories. Ogneupory 27 no.12:555-557 '62. (MIRA 15:12)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.
(Refractory materials—Testing)

TSIGLER, V.D.; YELTYSHEVA, A.A.; PINDRIK, B.Ye.

Technology, properties, and use of high-alumina lightweight
refractories. Sbor.nauch.trud. UNIIO no.5:113-136 '61. (MIRA 15:12)

(Refractory materials)

S/893/61/000/005/002/005
B117/B186

AUTHORS: Taigler, V. D., Yeltysheva, A. A., Pindrik, B. Ye.

TITLE: Technology, properties, and application of high-alumina light-weight refractories

SOURCE: Kharkov. Ukrayins'kyi naukovodoslidchyi instytut vohnetryv
Shornik nauchnykh trudov. no. 5(52), 1961, 113-136

TEXT: The development of an efficient production technology for high-alumina light-weight refractories was directed to obtaining products of the carborundum-mullite composition containing at least 80% Al_2O_3 , having a porosity of 57% and a volume weight of 1.5 g/cm^3 . The following raw materials were used: high-alumina fireclay, commercial alumina with different degrees of dispersion; kaolin from Vladimir as binding clay; petroleum coke with an ash content of about 3% as combustible addition. The composition of the masses was chosen on the basis of the Al_2O_3 content calculated in corresponding 3-component systems: high-alumina fireclays - kaolin - petroleum coke and commercial alumina - kaolin -

Card 1/3

Technology, properties, and application ...

S/893/61/000/005/002/005
B117/B186

petroleum coke. It has been shown that to a mass with an 80% Al_2O_3 content not more than 10 to 20% kaolin can be added. The bulk weight of the products of 1.5 g/cm^2 is guaranteed by the addition of 30% of petroleum coke. The products produced by the method described above offer good heat insulating properties, their thermal conductivity depending in some degree on the production method. They can be used as linings for working temperatures up to 1600°C , i.e. they are capable of sustaining temperatures some 200° higher than alumsilicate light-weight refractories of the types AJ-1.3 (AL-1.3) and KJ-1.3 (KL-1.3). The production of trial batches under varying conditions showed that the production technology based on high-alumina fireclays is preferable to that based on commercial alumina. The higher production costs of the fireclay production are compensated by the high quality of the products. The products produced on the basis of high-alumina fireclays are characterized by a higher thermal stability, impermeability to gases and smaller additional shrinking at 1600°C . It has been shown that the high-alumina light-weight refractories can be well used as linings for liquid-fuel auxiliary boilers on ships. They might also be used as

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Technology, properties, and application ...

S/893/61/000/005/002/005
B117/B186

linings for main boilers. The production of high-alumina light-weight refractories should be intensified in refractory plants in the South and the East of the USSR in order to meet the demands of the naval fleet. There are 14 figures and 15 tables.

Card 3/3

TSIGLER, V.D.; KAMENETSKIY, Yu.L.

Prospects for using and expanding the production of lightweight
refractories in the Ukrainian S.S.R. Ogneupory 27 no.3:116-120
'62. (MIRA 15:3)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporoy.
(Ukraine--Firebrick)

TSIGLER, V.D.; PINDRIK, B. Ye.

Technology of lightweight forsterite. Ogneupory 26 no.5:208-213
'61. (MIRA 14:6)

1. Ukrainskiy nauchno-issledovatel'skiy institut ogneuporov.
(Forsterite)

TSIGLER, V.D.

Plasticized dinas mortar. Standartizatsiia 24 no.11:39-40 II '60.
(MIRA 13:11)

(Mortar--Standards)

TSIGLIS, S. (Izhevsk)

After thirty years. Kryl. rod. 13 no.10:12 0 162.
(MIRA 15:10)

(Izhevsk--Parachuting)

TSIGMIT, Sh.

The region of Kentei, Mongolia. Vop.geog. no.35:243-252 '54.
(Kentei Mountains--Physical geography) (MLRA 7:12)

Tsigmit, Shagaydyr

USSR/ Geology - Diminishing lakes

Card 1/1 Pub. 86 - 25/38

Authors : Tsigmit, Shagaydyr

Title : Are the lakes of western Mongolia drying up?

Periodical : Priroda 44/7, page 113, Jul 1955

Abstract : The data provided by tests made of the waters in lakes in western Mongolia, which were made at different times over a period of 26 years, were confronted to show that the mineral content of the water of one of the lakes was increasing. This is taken as an indication that the lake is drying up. Two USSR references (1932-1952).

Institution :

Submitted :

TSIGMIT, Shagdaryn

From the past of the "Valley of lakes" in the Mongolian Gobi.
Priroda 44 no.8:94-95 Ag '55. (MLR 8:10)

1. Komitet nauk Mongol'skoy Narodnoy Respubliki, Ulan-Bator
(Gobi--Lakes)

Tsiguro, G. M.

USSR/Organic Chemistry - Synthetic Organic Chemistry, E-2

Abst Journal: Referat Zhur - Khimiya, No 1, 1957, 973

Author: Tsiguro, G. M.

Institution: Moscow Petroleum Institute

Title: Alkylation and Polymerization of Olefins with Esters of Mineral Acids

Original

Periodical: Avtoref. diss. kand. tekhn. n., Mosk. neft. in-t., Moscow, 1956

Abstract: None

Card 1/1

Tsiguro, G.M.

USSR/Organic Chemistry--General and theoretical questions on organic chemistry. G-1

Abs Jour: Referat Zhur-Khimiya, No 4, 1958, 11181.

Author : Gryaznov, G.V., Topchiyev, A.V., and Tsiguro, G.M.
Inst : Academy of Sciences USSR
Title : The Sulfochlorination of Methane by Gaseous Sulfur Dioxide and Chlorine.

Orig Pub: Doklady Akad Nauk SSSR, 113, No 3, 598-600 (1957)

Abstract: The gas phase sulfochlorination of methane by a mixture of SO_2 and Cl_2 under the action of UV-light and of x-rays has been investigated. The quantum yield of methylsulfonic acid did not exceed 0.006. When the reaction is carried out in the field of a high-frequency discharge up to 2-3% (based on methane) of the acid chloride of methylsulfonic acid is formed (reaction time 0.8-4.4 min). From the data

Card : 1/2

YEVGEN'YEVA, L.G.; TOPCHIYEV, A.V. [deceased]; TSIGURO, G.M.

Oxidizing sulfonation of carboxylic acids. Trudy MINKHIGP no.44:
114-117 '63. (MIRA 18:5)

1510449, 0.116
TOPCHIEV, A.V., akademik; GRYAZNOV, G.V.; TSIGURO, G.M.

Sulfooxidation of methane by gaseous sulfur dioxide and oxygen. Dokl.
An SSSR 113 no.4:839-841 Ap '57. (MLRA 10:6)

1. Moskovskiy neftyanoy institut im. I.M. Gubkina.
(Methanesulfonic acid)

15160000, 0.111
TOPCHIEV, A.V., akademik; TSIGURO, G.M.; GRYAZNOV, G.V.

Photochemical sulfoxidation of *n*-heptane by gaseous sulfur
dioxide and oxygen. Dokl. AN SSSR 113 no.6:1302-1305 Ap '57..
(MLRA 10:6)

1. Moskovskiy naftyanoy institut im. I.M. Gubkina.
(Heptanesulfonic acid)

TSIGURO, G.M.

USSR/Physical Chemistry - Kinetics, Combustion, Explosions, Topo-chemistry, Catalysis.

B-9

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7196.

Author : A.V. Topchiyeva, G.V. Gryaznov, G.M. Tsiguro.

Inst : Academy of Sciences of USSR.

Title : Methane Sulfooxidation by Gaseous Sulfur Dioxide and Oxygen.

Orig Pub: Dokl. AN SSSR, 1957, 113, No 4, 839-841.

Abstract: At the interaction of CH_4 with SO_2 and O_2 in gaseous phase under flow conditions in a field of high frequency discharge (duration of the discharge action from 1.4 to 4.5 min.), methanesulfonic acid (I) is produced in the amount of from 2 to 3% of the initial CH_4 . Also H_2SO_4 , CH_3OH , H_2O , acetylene and ethylene hydrocarbons, CO , CO_2 and H_2 were detected in the reaction products. The authors propose a chain mechanism of I synthesis with an intermediary formation of methanepersulfonic acid.

Card : 1/1

-6-

USSR/Physical Chemistry - Radiation Chemistry, Photochemistry,
Theory of Photographic Process.

B-10

Abs Jour: Referat. Zhurnal Khimiya, No 3, 1958, 7263.

7
sulfo acids were intermediate products. The structure of the heptanemonosulfo acid was determined, it is $\text{CH}_3(\text{CH}_2)_4\text{CHSO}_3\text{H}$. The synthesis of the benzylthiuronic salt of the heptane-sulfoacid is described. The possible mechanism of the process is discussed.

Card : 2/2

-2-

"APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001757020018-0

APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001757020018-0"

GRYAZNOV, G.V.; TOPCHIEV, A.V., akademik; TSIGURO, G.M.

Sulfochlorination of methane by sulfurous anhydride and chlorine
gases. Dokl. AN SSSR 113 no.3:598-600 Mr '57. (MLRA 10:6)

1. Moskovskiy neftyanoy institut im. I.M. Gubkina.
(Methanesulfonic acid)

"APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001757020018-0

APPROVED FOR RELEASE: 03/14/2001

CIA-RDP86-00513R001757020018-0"

AUTHOR GRYAZNOV G.V., TOPCHIEV A. (Member of the Academy) PA 3154
TSIGURO G.M.

TITLE Sulphochlorination of methane by Sulphurous Anhydride and Chlorine Gases.
Sulfokhlorirovaniye metana gazosbraznymi sernistyimi angidridom i khlorom (Russian)

PERIODICAL Doklady Akademii Nauk SSSR, Vol 113, Nr 3, pp 598-600 (U.S.S.R.)
Received 6/1957 Reviewed 7/1957

ABSTRACT On order to obtain the most favorable synthesis of the chlorine anhydride of methane sulphonic acid, the sulphochlorination of the methane must be carried out at conditions that warrant a higher degree of dissociation of methane, while forming methyl radicals, than that observed under the action of ultraviolet radiation. In order to prove this special tests were carried out with the help of gaseous sulphurous anhydride and sulphurous chlorine in a system with an eff lux in a high frequency field with electric discharge (Computed wave length 357.6 m). The experiment is described; It was found that on the occasion of the sulphochlorination of saturated aliphatic hydrocarbons two reactions are possible:
1) Photochemical sulphochlorination passes through a stage in which sulphinic acid forms which oxidizes with chlorine to chlorine anhydride of sulphonic acid.
2) Sulphochlorination in the field of the electric discharge develops to the accompaniment of the forming of radicals. The pro-

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Sulphochlorination of Methane by Sulphurous Anhydride PA . 3154
and Chlorine Gases .

cess is chainlike. Thus it was shown by experiment that, in principle, it is possible to obtain chlorine anhydride of methane sulphonic acid by the direct sulphochlorination of the methane through gaseous sulphurous anhydride and chlorine anhydride.
(With 2 Slavic references)

ASSOCIATION Moscow Mineral Oil Institute "I.M. Gubkin"
PRESENTED BY
SUBMITTED 15.10.1956
AVAILABLE Library of Congress
Card 2/2

TSIGURO, G.M.

AUTHOR: TOPCHIEV, A.V., Member of the Academy, GRYAZNOV, G.V., and
TSIGURO, G.M. PA - 2766

TITLE: Sulphooxidation of Methane by gaseous Sulphur Dioxide and Oxygen.
(Sul'fokisleniye metana gazoobraznym sernistym angidridom i kis-
lorodom. Russian).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 4, pp 839 - 841
(U.S.S.R.)
Received: 6 / 1957 Reviewed: 7 / 1957

ABSTRACT: The sulphooxidation reaction of methane has hardly been described
at all in published works. Methane dissolves slowly in fuming sul-
phuric acid, but the compounds formed on this occasion were never
isolated. With sulphuric anhydride methane reacts thermically and
thermocatalytically at the same time forming sulphoderivatives and
oxidation products. Usually other production methods are employed
in order to obtain methane sulphoacid and its derivatives. The
present work was carried out by using various additions as injec-
ting influence: ultraviolet light, X-rays, and high-frequency elec-
tric discharge for the purpose of finding a possibility of a direct
sulphooxidation of methane with gaseous and sulphuric anhydride and
oxygen. In Practice, this reaction is not possible under the in-
fluence of ultraviolet light. In this case only a photochemical
oxidation of methane and sulphurous anhydride took place. Only at
200 - 400° did the authors obtain 0,02 % of the theoretical

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Sulphooxidation of Methane by gaseous Sulphur Dioxide and Oxygen.

yield of methane sulphoacid. The principle process were: the oxidation of methane and sulphurous anhydride. It was possible to increase the yield (compared to methane) by to 2 - 3 % when a high-frequency field of electric discharge was used. The composition of solid, liquid, and gaseous reaction products indicates a great diversity and complexity of the processes taking place here: sulphur, sulphuric acid, methanol, water, formaldehyde, acetylene-hydrocarbons, CO , CO_2 , ethylene hydrocarbons, and hydrogen appear.

The process introducing the sulphooxidation reaction is probably the decomposition of the methane molecule into a methyl radical and hydrogen. The former reacts with the sulphurous anhydride and a metasulphin radical is formed which is further oxidized by oxygen and thus yields the radical of metapersulphonic acid. The latter reacts with methane and results in a molecule metapersulphonic acid and a new methyl radical. The former acid is unsteady. It is reduced by the sulphuric acid in the water to metasulphonic acid and an equimolecular quantity of sulphuric acid is formed. This scheme corresponds to that found by Nalbandyan for the photochemical oxidation of methane in the presence of mercury vapours. Considerable quantities of formaldehyde, which were obtained by the author, may further have been oxidized by the oxygen of the

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Sulphooxidation of Methane by gaseous Sulphur Dioxide and Oxygen.
air. As a result of this work it was established that in the field
of the high-frequency electric discharge a sulphooxidation of me-
thane by sulphurous anhydride and oxygen takes place. The reaction
is accompanied by a number of parallel processes . (2 citations
from Slav publications).

ASSOCIATION: Moscow Mineral Oil Institute "I.M.Gubkin".
PRESENTED BY:
SUBMITTED: 15.10.1956
AVAILABLE: Library of Congress

Card 3/3

1-18-UR 6-10.

AUTHOR: TOPCHIEV, A.V., TSIGURO, G.M., GRYAZNOV, G.V. 20-6-33/59
 TITLE: Photochemical Sulphooxidation of n-Heptane by Gaseous Sulphur Dioxide and Oxygen. (Fotokhimicheskoye sul'fokisleniye n-heptana gazoobraznymi sernistym angidridom i kislorodom, Russian)
 PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 113, Nr 6, pp 1302-1305 (U.S.S.R.)
 ABSTRACT: A direct sulphuration of n-heptane with sulphuric acid (oleum) is not very effective. Only small quantities of heptane sulphoacids are formed. The latter are also formed on the occasion of sulphooxidation by sulphurous anhydride with oxygen in the presence of organic superacids. The present work was carried out in order to investigate the direct photochemical sulphooxidation of n-heptane in the liquid phase. In all experiments carried out the yield was independent of the concentration of the sulphurous anhydride and the oxygen. It was directly proportional to the time of its blowing through by the n-heptane layer and thus dependent on the amount of light absorbed by the reacting substances. Degree of utilization of the sulphurous anhydride and of the oxygen depends linearly on the height of the layer of hydrocarbon. The previous introduction of benzoyl-superoxide does not accelerate the reaction considerably. In the presence of toluol the reaction was practically stopped. The experimental results showed that the reaction mentioned is a

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Dioxide and Oxygen. 20-6-33/59

consecutive one on which occasion mono- and disulphine acids are formed as intermediate products. The structure of the acid obtained was determined. Besides the consecutive reaction also the formation of heptanesulphoacid from heptanepersulphoacids can occur in any grade. Also sulphuranhydride is formed by the oxidation of sulphurous anhydride by the hydrosuperoxide of the n-heptane. Though the scheme given here is not definite, it allows the interpretation of experimental results. These are not sufficient for the determination of the mechanism and additional special investigations are necessary. (1 Slavic reference)

ASSOCIATION: Moscow Petroleum Institute "I.M.GUBKIN".
PRESENTED BY:
SUBMITTED:
AVAILABLE: Library of Congress

Card 2/2

TSIGURO, T.A.; DRUZHININA, A.V.

Effect of antioxidant additives on motor oils and fractions of
hydrocarbons isolated from them. Trudy VNII NP no.7:283-289
'58. (MIRA 12:10)

(Lubrication and lubricants--Additives)

SOV/65-58-10-8/15

AUTHORS: Khmel'nitskiy, Yu. L. and Tsiguro, T. A.

TITLE: The Solubility of Aluminium Chloride in Isobutane
(Rastvorimost' khlorigistogo alyuminiya v izobutane)

PERIODICAL: Khimiya i Tekhnologiya Topliv i Masel, 1958,³Nr 10,
pp 36 - 40 (USSR)

ABSTRACT: The complexity of supplying anhydrous aluminium chloride into the reactor creates difficulties during a number of industrial processes where aluminium chloride is used as a catalyst. The activity of the catalyst can only be maintained constant by introducing continuously fresh $AlCl_3$. Investigations were carried out as to the possibility of using $AlCl_3$ in the form of a solution in isobutane. A specially-designed laboratory apparatus was used (Fig.1). The isobutane fraction contained 91% isobutane, 3% normal butane, 4% propane and 2% pentane and higher hydrocarbons. Experimental data on the solubility of $AlCl_3$ in isobutane is shown in Fig.2. The dependence of the solubility of $AlCl_3$ in isobutane on the temperature and volume rate was also determined. In addition, it was necessary to ascertain whether the $AlCl_3$ solution remained identical, or whether complex compounds were

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The Solubility of Aluminium Chloride in Isobutane

formed. Differential heats of solution of AlCl_3 at saturation of the solution were also calculated. The equilibrium in the system: solution - dissolved substances, is determined in accordance with Gibbs' law. The functional dependence of the solubility on the temperature at constant pressure in an ideal system, where there is no chemical interaction between the components, can be determined according to the Clapeyron and Clausius equation. Calculated results are tabulated (Table 1). A graph in Fig.3 shows the dependence of the logarithms of solubility on the values of corresponding inverse absolute temperatures. The differential heat of solution was found to be independent of the concentration of the solution within large limits of concentration. An increase in the temperature makes it possible to obtain high concentrations of the aluminium chloride solution in isobutane; this is more satisfactory than reducing the volume rate of isobutane through the saturator. Experimentally determined heats of solution (11 cc/mole) are much lower than the sublimation heats which vary

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The Solubility of Aluminium Chloride in Isobutane ^{SOV/65-58-10-8/15}

according to different authors between 26.5 to 27.4 ccal/
mole. There are 3 Figures and 1 Table.

ASSOCIATION: VNII NP

Card 3/3

TSIGURO, T.A.; DRUZHININA, A.V.; FILIPPOV, V.F.

Performance of motor oils and hydrocarbon groups derived from
them. Khim.i tekhn.topl.i masel 4 no.2:18-24 F '59.

(MIRA 12:2)

(Lubrication and lubricants)

(Hydrocarbons)

36352
S/081/62/000/005/079/112
B162/B101

11.9700

AUTHORS: Druzhinina, A. V., Tsiguro, T. A., Filippov, V. F.

TITLE: Effect of the main types of additives on the operating characteristics and process of oxidation of oils in an internal combustion engine

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 5, 1962, 527, abstract 5M211 (Sb. "Prisadki k maslam i toplivam". M., Gostoptekhizdat, 1961, 247-253)

TEXT: An investigation is made of the effect of additives. --p-tert-alkyl phenolate of Ba (I), phenyl- α -naphthylamine (II), and tributyl phosphite in AC-10.7 (AS-10.7) oils (from sulfurous petroleum) and industrial-59 oil, and also in fractions of naphthene paraffin hydrocarbons, fractions of monocyclic aromatic hydrocarbons and fractions of polycyclic aromatic hydrocarbons separated from these oils, on the accumulation of oxidation products in the oils during tests on the IT9-2 (IT9-2) and PAS-51 (GAZ-51) engines. It is found that the quantity of deposits in grooves, rings,

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B162/B101

Effect of the main types ...

and the piston of the engine increases linearly with the operating time, and that I is most effective in reducing the quantity of these deposits. It is shown that, during the period in which the oil is working in the engine, peroxide compounds, free and esterified hydroxy acids, carbonyl compounds and carboxylic acids accumulate in it, and the accumulation of these oxidation products takes place to a much greater extent (2 - 4 times more) in the fractions of naphthene-paraffin hydrocarbons than in the oils or aromatic fractions; the accumulation of oxidation products in the oil starts without an induction period at the moment when the engine starts operating. The additives reduce the formation of peroxide compounds in the working oil by a factor of 2 - 3 (the most effective is II, the least is I), hydroxy acids by 20 - 60% (most effective is II), carbonyl compounds by a factor of 2 - 3 (the most effective is II) and carboxylic acids by a factor of 2 - 3 (the most effective are I and II). On the basis of the results obtained, compound additives were prepared, consisting of 2 additives of different types, and from the results of testing the additives in oils MK-22 (MK-22) and AC-11 (DS-11) the most effective proved to be

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Effect of the main types ...

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B162/B101

combinations of Tsiatim-339 + E^1 -1 (DF-1), Tsiatim-339 + $4E^1$ (AFB)
(Ba alkyl phenolate) and $5E^1$ (PMSya) + Vnii np-371. [Abstracter's note:
Complete translation.]

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L 20332-63 EPF(c)/EWT(m)/BDS AFFTC/APGC Pr-4 BW/WW/DJ

ACCESSION NR: AT3001996

S/2.664/61/000/000/0247/0253

AUTHORS: Druzhinina, A. V.; Tsiguro, T. A.; Filippov, V. F. ~~X~~ B

TITLE: The mechanism of the action of additives. Effect of basic types of additives on the operational properties and the oxidation process of oils in an internal-combustion engine.

SOURCE: Prisadki k maslam i toplivam; trudy nauchno-tekhnicheskogo soveshchaniya. Moscow, Gostoptekhizdat, 1961, 247-253.

TOPIC TAGS: lubricant, lubrication, oxidation, antioxidation, inhibitor, engine test, Ba, Zn, phenol, phenolate, amine, phosphite, tributylphosphite, residue, varnish, compatibility, piston ring, wear, IT9-2, GAZ-51, MK-22, DS-11, DF-1, TsIATIM-339, carbonyl, ketone.

ABSTRACT: Engine tests were performed to investigate the mechanism of the action of antioxidation additives. One additive (A) each was selected from the phenolic (n-mpem-octylphenolate of Ba), the amine (phenyl- α -naphthalene), and the phosphite (tributylphosphite) types. Tests with and without these A's were run in the internal-combustion engines IT9-2 and GAZ-51 to study the changes undergone by the oils and their chemical structural groups of hydrocarbons (HC). Most

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residue: Naphthene-paraffine HC's; least residue: polycyclic aromatic HC's; the monocyclic aromatic HC's were intermediate. All residue deposits were linearly proportional to time. The outstanding effectiveness of the n-mpem-octylphenolate of Ba (Ba-A) is set forth with reference to residue, varnish formation, and compatibility. Piston-ring wear with Ba-A is relatively high, probably because of the abrasive properties of the suspension of BaCO_3 formed on the cylinder surface during combustion. Optimal antiwear additive: The tributylphosphite (TBP), the effectiveness of which is interpreted in terms of the formation of polar compounds. It is postulated that the oxidation of the HC's in oils in an engine passes through a stage of formation of hydroperoxides. Theoretical reasonings and test data are adduced. Upon decomposition of the hydroperoxides oxy-compounds pertaining to the classes of alcohols or phenols form, also carbonyl compounds containing aldehydes and ketone groups. The possible unfavorable effects of each of these groups and the mode whereby additives can counteract them are discussed. The mechanism whereby the Ba-A can decrease the accumulation in the oil of complex esters is shown. In the subject tests no evidence whatever was found of an induction period in the accumulation of oxidation products in the crankcase oil. Thus, there is no confirmation of prevailing opinion that the action of additives reduces itself to a lengthening of the induction period. In all instances a slowdown of the primary and secondary oxidation processes was found. This investigation culminated in the

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compounding of the so-called multicomponent A's, including Ba alkylphenolate with Zn dithiophosphate, Ba alkylphenolate with TsIATIM-339 A, the TsIATIM-339 A with DF-1, et al. Test results of these and other compounded A's on the IT9-3 engine with MK-22 Baku-derived oil and DS-11 Eastern S-containing-crude derived oil according to the IDM-L-5 (VNII NP) method are tabulated extensively. The combination of TsIATIM-339 and DF-1 was found to be most effective. Orig. art. has 4 figures and 1 table.

ASSOCIATION: VNII NP

SUBMITTED: 00	DATE ACQ: 23Jan63	ENCL: 00
SUB CODE: FL, CH, EL	NO REF SOV: 005	OTHER: 000

Card 3/3

TSIGUROVA, G.N., kand.med.nauk

Malignant neoplasms of the accessory sinuses of the nose. Zhur.
ush., nos. i gorl. bol. 20 no. 3:22-26 My-Je '60. (MIRA 14:4)

1. Iz nauchno-issledovatel'skogo instituta ukha, gorla i nose
Ministerstva zdavookhraneniya RSFSR (dir. - zasl. deyatel'
nauki prof. V.K. Trutnev).

(NOSE, ACCESSORY SINUSES OF--CANCER)

~~TSIGUROVA, O.I.~~

Regulatory function of the respiratory enzyme carbonic anhydrase
in chronic stenosis of the larynx. Trudy gos.nauch.-issl.inst.
ukha, gorla i nosa. 6:400-405 '55. (MIRA 12:10)

1. Iz klinicheskogo otdeleniya (zav. prof.A.A.Atkarskaya)
Gosudarstvennogo nauchno-issledovatel'skogo instituta ukha,
gorla i nosa.
(CARBONIC ANHYDRASE) (LARYNX--WOUNDS AND INJURIES)

TSIGUROVA, G. N.

Dissertation: "Change in the Function of the Respiratory Enzyme -- Carbonic Anhydrase in Tracheal Respiration." Cand Med Sci, Kuybyshev State Medical Inst, Kuybyshev, 1954. (Referativnyy Zhurnal--Khimiya, Moscow, No 11, Jun 54)

SO: SUM 318, 23 Dec 1954

NIKITIN, V.N.; NOVIKOVA, A.I.; TSIKALO, A.P.

Changes with age in the tissue fractions of phosphorus and phosphorus fractions of "structural proteins" (liponucleoprotein complexes extracted by Edsall's reagent) in the heart, kidneys, and intestines of white rats. Uch. zap KHGU 108:81-94 '60. (MIRA 14:3)

1. Kafedra fiziologii cheloveka i zhivotnykh Khar'kovskogo gosudarstvennogo universiteta.

(NUCLEOPROTEINS) (AGE)

(PROTEIN METABOLISM)

ZHIDELEV, Mikhail Aleksandrovich, starshiy nauchnyy sotr.; BEL'BURT, B.Ye.; PROTASOVSKIY, G.A.; FIGANOV, I.S.; Prinimali uchastiye: KOVAL'SKIY, M.I.; SANDOMIRSKIY, I.G.; GIMRANOV, M.V.; TSIKALOV, V.A., red.; POLUKAROVA, Ye.K., tekhn. red.

[Secondary school production training in mechanical engineering]
Proizvodstvennoe obuchenie v srednei shkole po mashinostroitel'-
nym professiiam; metodicheskoe posobie dlia prepodavatelei i in-
struktorov proizvodstvennogo obucheniia. Pod red. M.A.Zhideleva.
Moskva, Izd-vo APN RSFSR, 1962. 141 p. (MIRA 15:12)
(Technical education)

TSIKALOV, V. A.

18(1,3)	PHASE 2 BOOK EXAMINATION	507/3402
	Sovetskaniye po primeneniyu redkikh elementov dlya dizainirovaniya fiziko-mekhanicheskikh svoystv konstruktsionnykh i spetsial'nykh staley i sployov	
	Reduktsionnyye elementy v stalyakh i sployakh; Tsvetnyye metally (Rare Earth Elements in Steels and Alloys; Transactions of the Royal Conference on the Use of Rare Earth Elements To Improve the Mechani- cal and Mechanical Properties of Structural and Special Steels and Alloys) Moscow, Metallurgizdat, 1959. 246 p. Irregularly inserted. 3,150 copies printed.	
	Ed.: A. A. Proshogin; Ed. of Publishing House: A. L. Ozeretskaya; Tech. Ed.: P. G. Isent'yeva.	
	PURPOSE: This book is intended for engineers, technicians and scientists engaged in the metallurgy of heavy and nonferrous metals, and may be used by students of higher educational schools, who are specializing in the metallurgical science of these metals.	
	Results of investigations and uses of rare earths as alloying components in steels and alloys. The influence of rare earth additives in improving the technical properties of structural, fire-resistant and other steels and alloys is also described. Figures, tables and references (mostly Soviet) accompany each article. No personalities are mentioned.	
	Logan, R. J., Candidate of Technical Sciences, Institut Khimicheskoy Ognetekhniki, Kristallograficheskii i fiziko-mekhanicheskiy otdel, Akademiya Nauk SSSR, Leningrad; and Krupnykh, M. M., Candidate of Technical Sciences, Institute for Production and the Trend in its Development (According to non- Soviet Literature)	5
	Yermolov, V. V., Engineer, Candidate of Chemical Sciences; K. M. Nikolayev, and R. P. Kuzmina, Engineers, Methods of De- termining Small Amounts of Rare Earths in Steels	26
	Savitskiy, Ye. M., Doctor of Chemical Sciences; V. P. Tereshkova, Candidate of Technical Sciences; and V. A. Tikhonov, Engineer, Investigation of the Physicochemical Interaction of Rare Earth Metals With Iron and Steel	31
	Bernikova, S. Ya., Engineer, Effect of Rare Earths on the Sulfur and Oxygen Contents of Molten Steel and the State of Sulfur in Solid Steel	50
	Kuliyev, V. S., Engineer, Dependency of the Mechanical Properties of Structural Steel 37KhN3A on Reducing Agents and Methods of Extraction	77
	Gulyayev, B. B., Doctor of Technical Sciences; I. A. Shapranov, Candidate of Technical Sciences; O. M. Kuznetsov, Candidate of Technical Sciences; and Z. D. Nizhnikova, Engineer, Influence of Rare Earths on the Crystallization and Mechanical Properties of Cast Steel	92
	Verbol'skaya, Ye. D., Engineer; L. V. Isakov, Engineer; and A. Ye. Khalabnikov, Doctor of Technical Sciences, The Effect of Cerium Additives on the Properties of Cr-Ni-Mo Steel for Shaped Steel Casting	118
	Gol'dshtern, Ye. Ye., Candidate of Technical Sciences, and O. D. Zhuravskiy, Engineer, The Effect of Cerium on the Structure and Properties of Cast and Forged Steel	130
	Kopp, L. P., Candidate of Technical Sciences, and G. A. Patukhov, Candidate of Technical Sciences, Study of the Effect of Rare Earths on the Physicochemical Proper- ties of Cr-Ni-Mo Steel	135
	Studnits, M. A., Candidate of Technical Sciences; Yu. E. Kondov, Engineer; and A. I. Sokolov, Engineer, The Influence of Rare Earths on the Nature of Fracture and the Structure and Properties of Steel	183
	Danilova, G. P., Candidate of Technical Sciences; M. V. Mal'tsev, Doctor of Technical Sciences; M. V. Poplavko, Candidate of Technical Sciences, Additives for Welding Titanium Alloys	196
	Loft, V. M., Candidate of Technical Sciences, and V. M. Burov, Engineer, Electrochemical Method of Producing Much Metal- Magnesium Alloys for Modified Cast Iron	204
	Kopp, L. P., Candidate of Technical Sciences; L. M. Shigida, Engineer; and O. D. Sudakova, The Problems of Causes for the Low Plasticity of Mn23Al8-Type Steel at High Temperature and Possibilities of Improving This Condition With Rare Earths	211

S/137/60/000/CC9/018/029

A006/A001

Translation from: Referativnyy zhurnal, Metallurgiya, 1960, No. 9, pp. 257-258,
21596

AUTHORS: Savitskiy, Ye.M., Terekhova, V.F., Tsikalov, V.A.

TITLE: Investigation of the Physico-Chemical Interactions of Rare-Earth
Metals With Iron and Steel 18

PERIODICAL: V sb.: Redkozemel'n. elementy v stalyakh i splavakh, Moscow,
Metallurgizdat, 1959, pp. 31-49

TEXT: The authors studied the interaction of rare-earth metals, such as
✓ La and Ce, ✓ with S, O, Si and C of steel and the effect of Ce and La on the mechan-
ical properties of Fe. The Fe-La system, with up to 2 weight percent La, was
studied by microscopical, electronscopical and mechanical methods. It is estab-
lished that small additions of rare-earth metals (0.2-0.5%) refine considerably
the structure of Fe and steel. Rare-earth metals are strong deoxidizers which
cause the fine-dispersed distribution of oxide impurities. The addition of 0.2-
0.5% rare-earth metals to steel containing S > 0.1% cause considerable desulfuri- ✓

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